Science Lib.

CONTENTS

Influence of Soil Acidity upon the Decomposition of Organic Matter in Soils. J. W. White, F. J. Holben, and C. D. Jeffries 1
The Settling Volume of Soils. H. E. Middleton and H. G. Byers 15
An Examination of the Degtjareff Method for Determining Soil Organic Matter, and a Proposed Modification of the Chromic Acid Titration Method. A. Walkley and I. Armstrong Black 29
A Critical Examination of Analytical Methods Used in the Determination of Exchangeable Potassium and Sodium of Soils. M. L. M. Salgado 39
An Electrometric-Titration Method of Finding the pH Value and Lime Requirement of Soils. Amar Nath Puri and Balmokand Anand 49
A New Apparatus for Measuring Soil Shrinkage. Amar Nath Puri, E. McKenzie Taylor, and A. G. Asghar 59
Oxidation Reduction Potentials in Soils: I. Principles and Electrometric Determination. Lindsey A. Brown 65
Book Review 77
The Influence of Copper Sulfate on Iron Absorption by Corn Plants. L. G. Willis and J. R. Piland 79
The Effect of Sulfur and Phosphorus on the Availability of Iron to Pineapple and Maize Plants. C. P. Sideris and B. H. Krauss 85
The Relation Between Replaceable Potassium and Field Response to Potash in Hawaiian Soils. O. C. Magistad 99
A New Method of Determining Base Exchange Capacity of Soils. Amar Nath Puri. 105
Studies on Tropical Soil Microbiology: I. The Evolution of Carbon Dioxide from the Soil and the Bacterial Growth Curve. A. Steven Corbet 109
A Study of Rhizobium Species in Relation to Nodule Formation on the Roots of Florida Legumes: I. W. R. Carroll 117
Studies on Podzols and Brown Forest Soils: I. Karl Lundblad 137
The Nature of Slick Soil in Southern Idaho. Philip Isaak 157
Influence of Eight Years' Successive Fertilizing with Concentrated Potash Salts and with Kainit on the Replaceable Bases of the "Terra Roxa" Soil. Theodureto De Camargo and P. C. De Mello 167
The Relation of Colloid Dispersion in Soils to Chemical Changes Induced by Biological Transformations of Organic Materials. John P. Conrad 179
The Influence of the pH of a Culture Solution on the Rates of Absorption of Ammonium and Nitrate Nitrogen by the Tomato Plant. H. E. Clark and J. W. Shive 203
A Study of Rhizobium Species in Relation to Nodule Formation on the Roots of Florida Legumes: II. W. R. Carroll 227
A Migration Method for the Determination of Replaceable Bases in Soils. Lawrence C. Wheeting 243
Electrodialysis as a Means of Studying the Nature of Soil Phosphates. L. A. Dean ... 253
The Fixation of Potash in Difficultly Available Form in Soils. N. J. Volk 267
The Distinction between Magnesium Absorbed and That Exchangeable, Four Years after Lysimeter Incorporations of Oxides and Carbonates. W. H. MacIntire, W. M. Shaw and Brooks Robinson 289
Calcium Cyanamid as a Nitrogenous Fertilizer. T. R. Moyer 305
Preservation of Soils Against Degeneration. W. L. Powers 333

Phosphate Fixation and Penetration in Soils. A. Floyd Heck 343
The Influence of the Hydrogen-Ion Concentration of the Culture Solution upon the Absorption and Assimilation of Nitrate and Ammonium Nitrogen by Peach Trees Grown in Sand Cultures. O. W. Davidson and J. W. Shive 357
Physiological Studies on Rhizobium: I. The Effect of Nitrogen Source on Oxygen Consumption by Rhizobium Leguminosarum Frank. R. H. Walker, D. A. Anderson and P. E. Brown 387
Laws of Soil Colloidal Behavior: XIV. Aging of Colloids and Base Exchange. A. J. Pugh 403
Sven Odén, 1888–1934. H. Lundegårdh 429
The Cause of Decreased Nodule Formation on Legumes Supplied with Abundant Combined Nitrogen. Franklin E. Allison and C. A. Ludwig 431
Plant Feeding by Briquette Fertilization. Francis E. Hance 457
The Influence of the pH of a Culture Solution on the Assimilation of Ammonium and Nitrate Nitrogen by the Tomato Plant. H. E. Clark and J. W. Shive 476
A Method for Determining the Capacity of a Soil to Fix Phosphorus in Difficultly Available Form. A. Floyd Heck 482
A Comparison of Superphosphate and Raw Rock Phosphate on Different Types of Soil. A. W. Blair, A. L. Prince and S. H. Winterberg 483

ILLUSTRATIONS

PLATES

The Settling Volume of Soils

Plate 1. Settling Volumes of A Horizons 27

The Influence of Copper Sulfate on Iron Absorption by Corn Plants

Plate 1. Effect of Copper Sulfate on Iron Absorption by Corn Plants 83
Fig. 1. Corn plants on peat soil with lime alone 83
2. Corn plants on peat soil with lime and copper sulfate 83
3. Iron accumulation in lower nodes of corn plants 83

A Study of Rhizobium Species in Relation to Nodule Formation on the Roots of Florida Legumes: I

Plate 1. Fig. 1. Soybean Culture 6, a Slowly Growing, Inefficient Nitrogen Fixer 135
2. Soybean Culture 68, a More Rapidly Growing, Highly Efficient Nitrogen-Fixing Rhizobium 135
3. Dimensions of the Larger Nodules of *Wistaria chinensis* 135
4. A Dense Growth of *Crotalaria spectabilis*, One of the Hardier Species 135

A Study of Rhizobium Species in Relation to Nodule Formation on the Roots of Florida Legumes: II

Plate 1. Effect of Inoculation with Various Soybean and Cowpea Cultures on the Growth of Soybean and Cowpea Plants 239
Fig. 1. Efficiency of soybean and cowpea nodule bacteria in symbiosis with the cowpea plant 239
2. Soybean plants showing variation in growth due to differences in nitrogen-fixing power of various cultures of soybean and cowpea nodule bacteria 239
3. Variation in growth due to the effect of different cultures on the cowpea plant 239
Plate 2. Fig. 1. The well-inoculated roots of cowpea plants in small plat 5 shown in plate 1, fig. 3 241
2. Morphological forms of cowpea nodule bacteria, culture 600 grown in asparagus-mannitol solution 241

Calcium Cyanamid as a Nitrogenous Fertilizer

Plate 1. Fig. 1. Sixty frames constructed from 2 inch by 12 inch boards 331
2. Settling of soil colloids 331

The Influence of the Hydrogen-ion Concentration of the Culture Solution upon the Absorption and Assimilation of Nitrate and Ammonium Nitrogen by Peach Trees Grown in Sand Cultures

Plate 1. Fig. 1. Representative trees grown in the ammonium series 383
2. Representative trees grown in the nitrate series 383
Plate 2. Fig. 1. Roots of representative trees grown in the ammonium series 385
2. Roots of representative trees grown in the nitrate series 385

PHYSIOLOGICAL STUDIES ON RHIZOBIUM: I. THE EFFECT OF NITROGEN SOURCE ON OXYGEN CONSUMPTION BY RHIZOBIUM LEGUMINOSARUM FRANK

Plate 1. Apparatus for Measuring the Effects of Nitrogen on Rhizobium 401
Fig. 1. Respiration vessel 401
2. Simple manometer of the Warburg type with respiration vessel attached 401
3. Water bath in which the temperature of the water surrounding the respiration vessels was thermostatically controlled within 0.01°C... 401

LAWS OF SOIL COLLOIDAL BEHAVIOR: XIV. AGING OF COLLOIDS AND BASE EXCHANGE

Plate 1. Effect of Aging on the Stability of Aluminum Silicate in a Solution of Barium Acetate 427

PLANT FEEDING BY BRIQUETTE FERTILIZATION

Plate 1. Effect of Briquette Fertilization on Papaya and Eucalyptus Seedlings..... 453
Fig. 1. Indicator plant: Papaya seedlings 453
2. Indicator plant: *Eucalyptus ovata* 453
Plate 2. Fig. 1. Cement type of slowly disintegrating fertilizer briquette 455
2. Indicator plants: Papaya seedlings and *Eucalyptus ovata* 455
Plate 3. Fig. 1. Briquette fertilization of sugar cane 457
2. Types of briquettes 457

TEXT-FIGURES

INFLUENCE OF SOIL ACIDITY UPON THE DECOMPOSITION OF ORGANIC MATTER IN SOILS

Fig. 1. Course of Carbon Dioxide Production in 14 Days from the Six Soils as the Results of Different Treatments 8
2. Relative Carbon Dioxide Producing Capacity of the Six Soils as Influenced by various Treatments 9

THE SETTLING VOLUME OF SOILS

Fig. 1. Settling Volumes of A Horizons 18
2. Settling Volumes of B Horizons 18
3. Relation of Settling Volume to Moisture Equivalent 21
4. Relation of Settling Volume of Colloids to Silica-Sesquioxide Ratio 23
5. Water Relationships of Erosion Station Surface Soils 24

AN EXAMINATION OF THE DEGTJAREFF METHOD FOR DETERMINING SOIL ORGANIC MATTER, AND A PROPOSED MODIFICATION OF THE CHRONIC ACID TITRATION METHOD

Fig. 1. Relations Between Total Carbon as Obtained by Dry Combustion and Carbon as Obtained by the Reduction Methods Using Chromic Acid and Either Hydrogen Peroxide or Water 33

AN ELECTROMETRIC-TITRATION METHOD OF FINDING THE pH VALUE AND LIME REQUIREMENT OF SOILS

Fig. 1. Arrangement of Apparatus in the Electrometric-Titration Method 50
2. Titration Curve of the Universal Buffer Solution 51

A NEW APPARATUS FOR MEASURING SOIL SHRINKAGE

Fig. 1. Diagram of Shrinkage Measuring Apparatus 60
2. Typical Shrinkage Curves of Soils 62

OXIDATION REDUCTION POTENTIALS IN SOILS: I. PRINCIPLES AND ELECTROMETRIC DETERMINATION

Fig. 1. Type of Half Cell Used 69

THE EFFECT OF SULFUR AND PHOSPHORUS ON THE AVAILABILITY OF IRON TO PINEAPPLE AND MAIZE PLANTS

Fig. 1. Average Annual Rainfall, Total Replaceable Bases, and pH of Soils on the Slope between Lower Brodie and Upper Helemano Districts on the Island of Oahm. 86
2. Water-soluble Iron Concentrations at Different pH Values of Certain Soils of Pineapple Fields 88

THE RELATION BETWEEN REPLACEABLE POTASSIUM AND FIELD RESPONSE TO POTASH IN HAWAIIAN SOILS

Fig. 1. Harvest Yields of Pineapple Fruits in Field Experiments with Varying Potash Fertilization 101

STUDIES ON TROPICAL SOIL MICROBIOLOGY: I. THE EVOLUTION OF CARBON DIOXIDE FROM THE SOIL AND THE BACTERIAL GROWTH CURVE

Fig. 1. 112

STUDIES ON PODZOLS AND BROWN FOREST SOILS: I

Fig. 1. The Loss on Ignition and the Amounts of Silica and Sesquioxides Extracted with the Acid-Oxalate Method, Per Cent of Oven-Dry Soil, in Profile 1 150
2. The Loss on Ignition and the Amounts of Silica and Sesquioxides Extracted with the Acid-Oxalate Method, Per Cent of Oven-Dry Soil, in Profile 3 150
3. The Loss on Ignition and the Amounts of Silica and Sesquioxides Extracted with the Acid-Oxalate Method, Per Cent of Oven-Dry Soil, in Profile 4 152
4. The Loss on Ignition and the Amounts of Silica and Sesquioxides Extracted with the Acid-Oxalate Method, Per Cent of Oven-Dry Soil, in Profile 5 152
5. The Loss on Ignition and the Amounts of Silica and Sesquioxides Extracted with the Acid-Oxalate Method, Per Cent of Oven-Dry Soil, in Profile 7 153

INFLUENCE OF EIGHT YEARS' SUCCESSIVE FERTILIZING WITH CONCENTRATED POTASH SALTS AND WITH KAINIT ON THE REPLACEABLE BASES OF THE "TERRA ROXA" SOIL

Fig. 1. Graphs of Buffer Surface and Buffer Numbers of Soil Samples Treated with Different Quantities of Tenth-Normal Hydrochloric Acid 172
2. The pH Values of Soil Samples Treated with Different Quantities of Tenth-Normal Calcium Hydroxide 172

THE INFLUENCE OF THE pH OF A CULTURE SOLUTION ON THE RATES OF ABSORPTION OF AMMONIUM AND NITRATE NITROGEN BY THE TOMATO PLANT

Fig. 1. Milligrams of Nitrogen Absorbed per 100 Gm. Green Tissue in 6 Hours by Plants 41 Days Old 210
2. Milligrams of Nitrogen Absorbed per 100 Gm. Green Tissue in 6 Hours by Plants 52 Days Old 213
3. Milligrams of Nitrogen Absorbed per Gram Dry Plant Tissue in 6 Hours by Plants 38 Days Old 216

A MIGRATION METHOD FOR THE DETERMINATION OF REPLACEABLE BASES IN SOILS

Fig. 1. Experimental Arrangement for Extracting the Bases from Soils by the Migration Method 246

ELECTRODIALYSIS AS A MEANS OF STUDYING THE NATURE OF SOIL PHOSPHATES

Fig. 1. Rates of Removal by Electrodialysis of Phosphorus from Tribasic Calcium Phosphates and Rock Phosphate 255
2. Rates of Removal by Electrodialysis of Phosphorus from Soil Untreated and Treated with Calcium Phosphates 255
3. Rates of Removal by Electrodialysis of Phosphorus from Difficultly Soluble Phosphate Compounds 257
4. Rates of Removal by Electrodialysis of Phosphorus from Soils Containing Difficultly Soluble Phosphate Compounds 257
5. A Comparison of the Rates of Removal of Phosphorus by Electrodialysis from Hawaiian Soil 4391 and from Iron and Aluminum Phosphates, All Samples Containing Equal Quantities of Phosphorus 260
6. Rate of Removal of Phosphorus by Electrodialysis from a Treated and an Untreated Soil and from Dufrenite. Also a Curve Based on the Sum of the Corresponding Ordinates of the Two Lower Curves 264

THE FIXATION OF POTASH IN DIFFICULTLY AVAILABLE FORM IN SOILS

Fig. 1. Effect of the Concentration of Soluble Potash on the Amount Fixed by Miami Silt Loam When Treated with Varying Quantities of Potassium Bicarbonate and Then Alternately Wetted and Dried 10 Times at 70°C 270
2. Potash Content of the Textural Separates of Four Soils 271
3. Amounts of Potash per Acre Fixed in Difficultly Available Form by the Textural Separates of Four Soils Treated With 60 Tons per Acre of Potash and Alternately Wetted and Dried 10 Times at 70°C 272
4. A Comparison of the X-Ray Pattern of Pure Muscovite with the Patterns of the Heavy Colloidal Fractions of the Potassium Chloride and Check Plats of Hagerstown Silt Loam, Showing Muscovite to be More Plentiful in the Potassium Chloride Plat 282

THE DISTINCTION BETWEEN MAGNESIUM ABSORBED AND THAT EXCHANGEABLE FOUR YEARS AFTER LYSIMETER INCORPORATIONS OF OXIDES AND CARBONATES

Fig. 1. Comparison of Four Procedures in Effecting Recoveries of the Magnesium Residues from 32-Ton CaO ≃ Additions of Oxide, Hydroxy Carbonate, and Normal Carbonate 4 Years after Incorporations in Outdoor Lysimeters 300

PHOSPHATE FIXATION AND PENETRATION IN SOILS

Fig. 1. The Relation of Calcium and Active Aluminum and Iron to the Form and Availability of Applied Phosphorus Fixed in the Soil 344
2. Rate of Solution or Solubility Curves for Known Phosphates and for the Native and Applied Phosphates in Soils 346
3. The Relative Amounts of Availability of the Phosphates Formed in Different Soils From Applied Soluble Phosphate 348
4. The Downward Penetration of Phosphorus and Its Recovery in Readily Available Form 350

THE INFLUENCE OF THE HYDROGEN-ION CONCENTRATION OF THE CULTURE SOLUTION UPON THE ABSORPTION AND ASSIMILATION OF NITRATE AND AMMONIUM NITROGEN BY PEACH TREES GROWN IN SAND CULTURES

Fig. 1. Average Dry Weight Yields in Grams and Average Absorption Rates in Milligrams per Gram of Dry Plant Material per Hour 368
2. Average Growth Increments as Indicated by Increase in Height of Main Stems per Day 369

3. Inorganic Nitrogen in Peach Roots Expressed in Per Cent of Dry Matter. Rates of Absorption of Inorganic Nitrogen by Peach Trees Expressed in Milligrams per Gram of Dry Matter per Hour 375
4. Nitrogenous Fractions in Stems of Peach Trees Expressed in Per Cent Green Matter, and in Per Cent Total Organic Nitrogen 376
5. Nitrogenous Fractions in Peach Roots Expressed in Per Cent Green Matter, and in Per Cent Total Organic Nitrogen 377

PHYSIOLOGICAL STUDIES ON RHIZOBIUM: I. THE EFFECT OF NITROGEN SOURCE ON OXYGEN CONSUMPTION BY RHIZOBIUM LEGUMINOSARUM FRANK

Fig. 1. The Rate of Oxygen Consumption by *Rhizobium leguminosarum* in Yeast Extract Media 392
2. The Rate of Oxygen Consumption by *Rhizobium leguminosarum* in Media Containing Ammonium Chloride, Sodium Nitrate, Urea, and Alanine 395
3. Ratio of the Amount of Oxygen Consumed in 30 Hours in Media Containing Various Nitrogen Sources to that Consumed in a Nitrogen-Free Medium 395

THE INFLUENCE OF THE pH OF A CULTURE SOLUTION ON THE ASSIMILATION OF AMMONIUM AND NITRATE NITROGEN BY THE TOMATO PLANT

Fig. 1. Nitrate Nitrogen in Tomato Roots and Rates of Absorption Nitrate Nitrogen from Culture Solutions 465
2. Ammonia Nitrogen in Tomato Roots and Rates of Absorption of Ammonia Nitrogen from Culture Solutions 466
3. Ammonia Nitrogen, Basic-Free Amino Nitrogen, and Soluble Organic Nitrogen in Tomato Roots 467
4. Total Soluble Organic Nitrogen in Leaves, Stems, and Roots of Tomato Plants. 473

A METHOD FOR DETERMINING THE CAPACITY OF A SOIL TO FIX PHOSPHORUS IN DIFFICULTLY AVAILABLE FORM

Fig. 1. The Recovery of Applied Phosphorus Fixed in Moist Soils in Readily Available Form, and the Relation of the Direct and Corrected Recovery Values of the Proposed Method of These Data 478